A Poor Man's Hydraulic Press

by Pete Stanaitis
Baldwin, Wisconsin

I have assembled a "poor man's hydraulic press" using a 20 ton H-frame press and a Harbor Freight air-over hydraulic jack It works pretty well and has even welded a couple of Damascus billets. I'm sure it's not new on the face of the earth, but it sure is a handy tool. There is more info on it at www.spaco.org/Press.htm.

A 20-ton press modified for blacksmithing use.

We mostly use it as a hydraulic press for pressing out and in, bearings, etc. But I have made a couple of different 10" long pressbrakes for it and they work quite well for sheet metal up to 1/8" thick and maybe 16" wide. The throat is about 20" wide. I have even bent 1/8" mild steel 16" wide to 90 degrees by making partial bends and moving along. So far, I have used mild steel for most of the dies. I have simply used mild steel square bars on the diamond for the upper die and machined a 45 in the lower die. In the future, I intend to make (or maybe even buy) a more conventional press brake accessory.

The 20 ton hydraulic jack does all the work. When you buy one, you use muscle power to pump a handle on the jack that forces oil into the piston, pushing the piston up a tiny bit with each stroke. Since the piston is pushing against the top of the press frame, that effort simply pushes the base of the jack, and therefore the spring loaded jack stage, downward. There is a small valve in the base of the jack that releases the oil to allow the jack piston to retract. You have to twist this valve 1/4 turn ccw or so (using the end of the jack handle) to let the piston return.

A closer look at the air-over-hydraulic jack. The control hoses have been extended, and the small air cylinder added to the release valve.

What I did was to buy a different jack that fits into the exact same place as the hand-pumped jack the came with the press. This jack is a 20 ton air-over-hydraulic jack (sometimes as cheap as $69.95 on sale). From the front, it looks just like the jack that came with the press. But, on the backside of this jack there is an air cylinder (it's called an "air motor") attached to the jack base. When compressed air up to about 100 psi is fed to the air motor, it makes a putt-putt sound and, with each "putt", it pumps the piston upwards just like when you pump by hand, but faster.

Before I put the air jack on, I added a 1 1/2" knob to the jack release valve so I didn't have use the jack handles to release the jack. (This alone made the thing a lot easier to use.) It is that knob that I have attached the little "crank arm" to for the air cylinder.

I added the little Bimba air cylinder to open and close the retraction valve, but since it is controlled by a valve, I can operate it from the floor, leaving both hands free.

I extended the hose between the air motor and its control valve so it would reach the floor. I also added a 3-way valve for the retraction cylinder. It too is at floor level, mounted right beside the air motor valve. In the picture, the valve on the left (the one with the little yellow tag) is the "pressing" valve and the valve on the right (the larger valve) is the retract valve. Only air moves in these valves, no oil. All the oil movement is contained within the jack itself.

The real key to making it handy is having the controls on the floor so you can use both hands. (With due diligence toward safety, of course… twenty tons is more than enough to sever any carelessly placed body parts. Keep your hands well clear during operation!)

The foot control valves. Air comes in via the darker hose on the left. The smaller valve on the left applies downward pressure to the press, and the larger 3-way valve on the right operates the small Bimba cylinder, releasing the pressure.

The air plumbing is as follows: Air from the compressor goes to both air control valves (black hose with quick disconnect). The red hose sends air from the air motor control valve to the air motor. The skinny white plastic hose sends air from the retraction valve to the retraction cylinder (the Bimba air cylinder).

In use, Air from my 1 hp Craftsman air compressor (which is set to 125/140 psi) is fed to both of the floor mounted control valves. When you step on the control valve for the jack piston, the air motor runs and the table is forced downward. When you step on the "release" control valve, the Bimba cylinder pulls in to rotate the retraction valve, the jack piston returns and the jack stage goes upward. when you take your foot off the release control valve, the Bimba cylinder's internal spring pushes its piston back outward, closing the retraction valve on the jack..

The closer it is to "the action" the more it gets used. You can even use it as a clamp to hold work pieces together for drilling or for welding.

I am considering replacing the release air cylinder with a bicycle brake cable or something like that (maybe a car's clutch cable?) to make it cheaper for others to build, but haven't gotten "aroundtoit" yet.

It would be nice to have a pressure gage on the jack. A guy gave me a process for adding one, but it requires disassembling the hydraulic end to drill a hole and I just haven't gotten around to that either.

The way the thing is currently configured, you can easily (no tools required at all) remove the jack and use it as jack under a vehicle or whatever, with or without an air supply. The jack is held in place by the springs when the pressure is off, and by the power of the jack when the pressure is on.

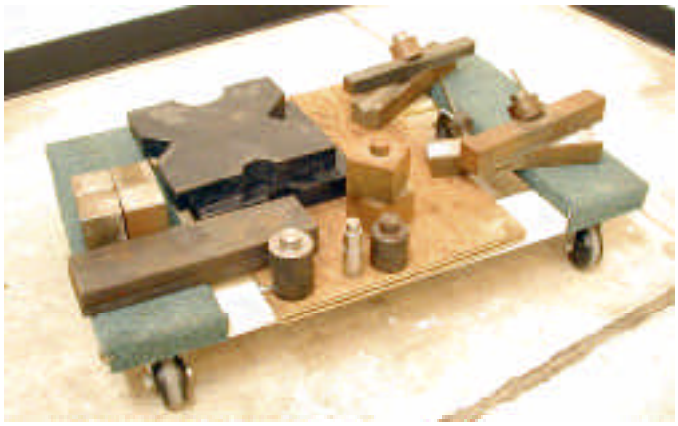
My jacks (I have made 2 of these machines, one for me and one for a son) came from Harbor Freight at least 4 or 5 years ago and neither one has leaked yet.

Casters are coming this week and I finally found room to move it back into my heated metal shop (after it being banished to the cold garage for 2 years while a new woodworking shop was built) where it will get even more use.

Finally, once you get one of these things, air powered or not, you just make jigs as needed for whatever.. We have a few dozen home made punches and bolsters to fit specific jobs

Mounting the Tooling

The press comes with a 2" diameter "socket" mounted right under the center of the jack for attaching tooling. It has a one-inch diameter hole about 3/4" inch deep. There is a 1/4-20 set screw in the side of it for retaining the tool. As purchased, the press has a cylindrical press die mounted there.



Some of the press tooling, including some bending brakes for thin sheet metal or bar stock. These can be easily welded up as needed.

I scrounged the air valve and the air cylinder. But I have checked and that Bimba cylinder sold for $16 that last time I looked. A 3 way valve would probably cost about $30-40. Let's call it $50 for the pair. If so, the I'd have about $220 + $80 +50 = $350 if I had to buy the whole thing new. Obviously, I already had the air compressor.

Do note that you end up with an extra 20 ton jack! I suppose it would sell on Ebay or Craigslist, but I don't get rid of much of my stuff, it just keeps piling up.

Harbor Freight sells a 12 ton bench size press and they also sell a 12 ton air-over hydraulic jack, should you want a smaller/lighter press.

Editor's Note:The press frames currently cost about $250, sometimes less on sale. The air/hydraulic bottle jacks list for $120, but I have a catalog with a sale price of $80 While I hate buying Chinese shop tools, this is one of those cases where there's little alternative… the steel.alone would cost you more than the entire press. They can be upgraded with heavier sections in a few key places, and sometimes this is required due to poor quality control. Using ANY Chinese tool near capacity can sometimes result in a failure, so be careful if you ramp up the pressure. Be especially careful the jack or hoses, and watch for deterioration over time. I recommend adding safety guards around anything carrying pressure– BG